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The reports of research published in this magazine are necessarily qualified by the conditions of the tests from which the data are obtained. Whenever it is deemed possible to do so, generalizations are drawn from the results of the tests; and, unless this is done, the conclusions formulated must be considered as specifically pertinent only to described conditions.

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RURAL AND URBAN CONTRIBUTIONS TO HIGHWAY TRAVEL AND EXPENDITURES

BY THE DIVISION OF CONTROL, BUREAU OF PUBLIC ROADS

Reported by ROBERT H. PADDOCK, Associate Highway Engineer-Economist

THE steadily mounting emphasis on the function of highway transportation in the national life has directed increased attention to and investigation of the sources of funds with which the existing highway systems have been constructed, of the use and benefits derived from the highway systems, and of the probable amount and source of future funds necessary for the maintenance and improvement of the present system.

Since 1930, financial surveys, with particular reference to these phases of the highway problem, have been made in several States by the Bureau of Public Roads in cooperation with the State highway departments and the University of Wisconsin. In four of these States (Wisconsin, Minnesota, New York, and Colorado) special inquiries into the constituent elements of road use were made as a part of the financial analyses. These investigations enable analyses to be made that may point toward an adequate solution of the problem of the present and future financing of the entire highway system.

These studies are among the first that have attempted to obtain an evaluation of the benefits derived from taxes paid for the construction and maintenance of all roads and streets within a State. One of the first attempts to obtain data with which such an evaluation could be made appears to have been a study conducted in Wisconsin about 1916, under the direction of A. R. Hirst, State highway engineer, who reported in part as follows:

A careful inquiry (through written question sheets) among automobile owners indicates that the average distance traveled by each automobile is at least 3,500 miles per year on roads outside the limits of incorporated cities and villages. If we estimate 140,000 pleasure cars in use in Wisconsin next year, which seems conservative, and each travels this number of miles, the motor travel on Wisconsin rural highways will be 490,000,000 miles. This does not take into consideration the travel of automobiles from other States. * * *

It should be remembered that the total mileage traveled is being vastly increased each year. If we assume only 225,000 automobiles and trucks used for rural hauling in use in 1926 and that they will travel only 3,500 miles each, the total rural travel in 1926 will be 787,500,000 miles and the saving in that year to automobile owners alone, if a system of good roads was completed by that time, would be \$7,875,000.¹

While this early study indicates cognizance of the problem, it also indicates, by contrast with present conditions, the tremendous increase in importance that the problem has assumed in the succeeding 2 decades. Only 14 years after the above report was written the total vehicle-miles of travel on the rural highways of Wisconsin was approximately 10 times the amount estimated to have been traveled in 1916.

Although the main highways of nearly all States have been brought to a much higher degree of improvement in the intervening time there is an articulate current demand for more extensive highway development than is possible with the revenues now available. It is essential, therefore, to consider all factors that influence the need of highway facilities by different classes of highway users. These factors must include consideration of

the ability to finance the desired system, and the equity of any taxation system established for that purpose. Investigations of the amounts of traffic carried by the several highway systems and the sources of that traffic are prerequisites to the determination of a sound financing policy.

HIGHWAY TAXES AND HIGHWAY USE BY URBAN AND RURAL RESIDENTS DETERMINED

The complete analyses of the highway financial problem accompanied by the road-use investigations made in Wisconsin in 1930, in Minnesota in 1933, and in Colorado and New York in 1934, form the basis of this comparative study.²

Data for the road-use survey were obtained in each State by a large number of personal interviews with representative motor-vehicle owners throughout the State, the sample being apportioned according to the distribution of vehicles in the respective rural and urban areas.

An estimate of the monetary importance of highway traffic within a State may be gained from table 1, which shows the estimated total vehicle-miles traveled annually in each of the States included in this analysis and an evaluation of the operating cost of this travel based on the conservative figure of 3 cents per mile.

TABLE 1.—Estimated total travel within the State of residence by motor-vehicle owners, and estimated transportation cost incurred

State	Year	Travel in State by resident motor-vehicle operators	Estimated transportation cost at 3 cents per mile
		Vehicle-miles	
Colorado.....	1934	1,967,800,000	\$59,634,000
Minnesota.....	1933	5,131,700,000	153,951,000
New York.....	1934	19,472,700,000	584,181,000
Wisconsin.....	1930	5,997,000,000	179,910,000

¹ All vehicle travel data for the 4 States given in this analysis will be for the respective years shown in this table.

² Residents of New York City accounted for 6,456,300,000 vehicle-miles or 33.2 percent of the total.

Annual vehicle operating expenditures of such magnitude make it desirable to answer the following questions:

1. By whom—that is, by residents of which governmental units—are these amounts spent?
2. For travel on what roads are these outlays made? (While present data make it difficult to evaluate exactly the relative earning power of the several highway systems, the proportional share of the travel carried by the several systems can be determined).
3. What expenditures are made for the highway system to provide for this travel?
4. Who pays for the construction and maintenance of the highway system, and what is the relation of such

² A summary of the Wisconsin survey was published in PUBLIC ROADS, vol. 14, no. 2, April 1933; the complete Minnesota report was published by the Minnesota Department of Highways and a summary appeared in PUBLIC ROADS, vol. 17, no. 1, March 1936. The complete New York report was published by the New York State Division of Highways and was summarized in PUBLIC ROADS, vol. 17, no. 9, November 1936. The Colorado report has not yet been printed.

¹ Page 34, Third Biennial Report, Wisconsin Highway Commission, 1916.

expenditures to the use these individuals or residents of rural and urban areas make of the highways?

5. Who should bear the cost of present and future maintenance and extension of the system?

6. Who is best able to bear such costs?

Taxation for highway purposes has assumed a different aspect than most other forms of taxation because highway users are taxed in direct proportion to the extent of vehicle use. The amounts so collected have directly affected the extent of the traffic facilities provided. An investigation into the use of the facilities financed by these taxes seems warranted.

Inquiries to determine the extent of use of the various highways indicate that in each of the four States studied almost half of the total travel is performed on the primary highway systems, and that, except in New York, more than one-fifth of the total travel is performed on the secondary system and on the purely local rural roads—constructed and maintained either by the township or county. Tables 2 and 3 show the percentages of travel performed on each of the highway systems of these States on the basis of data obtained in road-use investigations.³ In table 2 the amount of travel on urban streets that form part of the respective primary and secondary highway systems has been included with the total travel on those systems, while in table 3 the travel so performed has been allocated to the respective urban streets. In the latter table, only travel on the rural sections of the systems is included in the primary- and secondary-road travel.

TABLE 2.—Percentage of total travel by motor-vehicle owners on the highway systems of their respective States

State	Percentage of travel on—				Total
	Primary highways ¹	Secondary highways ¹	Local rural roads	Urban streets	
	Percent	Percent	Percent	Percent	Percent
Colorado.....	48.9	13.4	8.9	28.8	100
Minnesota.....	44.4	19.8	6.1	29.7	100
New York.....	44.8	5.9	2.6	46.7	100
Wisconsin.....	52.7	13.6	7.9	25.8	100

¹ Data for the primary and secondary highways include travel on the urban extensions or connecting sections of the rural portions of the respective systems.

² 59.4 percent of the total local travel on New York urban streets was performed on streets in New York City. Thus, 27.8 percent of all travel on urban streets, excluding urban extensions of rural highway systems, was performed in New York City.

TABLE 3.—Percentage of total travel by motor-vehicle owners on the rural and urban roads and streets of their respective States

State	Percentage of travel on—				Total
	Primary rural roads ¹	Secondary rural roads ¹	Local rural roads	Urban streets	
	Percent	Percent	Percent	Percent	Percent
Colorado.....	42.0	12.3	8.9	36.8	100
Minnesota.....	34.5	18.5	6.1	40.9	100
New York.....	30.6	4.1	2.6	62.7	100
Wisconsin.....	52.7	13.6	7.9	25.8	100

¹ Only travel on rural portions of the primary and secondary highway systems included. Travel on the urban streets serving as connecting links is shown under travel on urban streets except in Wisconsin.

² 49.4 percent of this travel, or 31 percent of all urban travel was on New York City streets.

³ Includes travel on city and village streets which served as connecting links for the rural systems.

Extensive systems of roads and streets were needed to serve the volumes of traffic shown in table 1. The

⁴ The expenditures and travel on urban streets in this and succeeding tables refer to expenditures and travel on the streets of all incorporated places or municipalities within the respective States.

motor-vehicle registrations of these four States and their respective street and highway mileages are shown in table 4. It shows that the streets and highways of New York accommodated the greatest number of vehicles per mile of highway. It would be expected, therefore, that expenditures per mile of highway would be greatest in that State.

In determining road-use relations highway users are divided into rural and urban groups, since highway taxation and highway use are distinctly different for these two groups. In this study, urban groups include all incorporated places (municipalities) within the respective States; the rural areas comprise the remainder of the State. Certain areas having urban characteristics but existing without benefit of incorporation are found in each of the States, but it is impossible to separate them for comparative fiscal purposes from the more inclusive rural governmental units containing them. The number and importance of such urbanized areas in the States studied are, however, relatively small. All comparisons made will be between rural and urban areas of each of the States, though certain travel characteristics in specific urban areas studied in the road-use survey will also be given.

TABLE 4.—Population, motor-vehicle registration, and street and highway mileages

State	Year ¹	Population (1930)	Motor-vehicle registration	Street and highway mileage	Persons per vehicle	Vehicles per mile of road
Colorado.....	1932	1,035,791	285,860	52,614	3.6	5.4
Minnesota.....	1932	2,563,953	704,896	111,475	3.6	6.3
New York.....	1932	12,588,066	2,296,063	100,593	5.5	22.8
Wisconsin.....	1930	2,939,006	794,404	89,539	3.7	8.9

¹ All data on highway mileages, highway expenditures, motor-vehicle registrations, and all fiscal data, will be for the years given here for the respective States.

² City and village street mileage, except that on State or county connecting routes, was not available in this study.

³ 6,930,446 persons in New York City, or 55.1 percent of the State total.

⁴ 797,101 vehicles in New York City, or 34.7 percent of the State total.

⁵ 5,271 miles in New York City, or 5.3 percent of the State total.

TREND TOWARD FINANCING PRIMARY HIGHWAYS FROM HIGHWAY-USER REVENUES OBSERVED

The data presented in table 4 suggest the relative magnitude of the highway problem in these four States. Later tabulations show the relative use of the available facilities and the source and amount of expenditures on the respective State systems.

While the percentages shown in tables 2 and 3 indicate the relative use of the several highway systems in each State, it is necessary for comparative purposes to determine the amounts and sources of expenditures on each of these systems. Table 5 shows the total amounts of expenditures on each of the highway systems of the four States in the year studied. Table 6 shows similar data but segregates expenditures on the rural portions of the several systems from expenditures on the urban extensions⁴ in order to distinguish rural and urban expenditures according to location of the roads and streets. Tables 5 and 6 are similar in the classifications used to tables 2 and 3, respectively, and have been set up so that direct comparisons can be made.

The various networks of highways as now constituted in the several States are never exactly comparable as to function, demands on their facilities, or physical characteristics. This is especially true of the relation of the existing primary system to the entire highway system in the respective States. Table 7

⁴ Except for Wisconsin where such a separation was not possible.

TABLE 5.—Amount and percentage of total road and street expenditures, by highway systems

State	Expenditures made on—								Total	
	Primary system ¹		Secondary system ¹		Local rural roads		Urban streets			
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Colorado.....	\$5,563,600	43.9	\$2,065,200	16.3	\$3,012,000	23.8	\$2,035,500	16.0	\$12,676,300	100
Minnesota.....	32,149,900	57.7	12,720,700	22.8	3,894,300	7.0	6,967,700	12.5	55,732,600	100
New York.....	68,094,300	31.6	38,284,400	17.8	22,531,100	10.4	² 86,673,400	40.2	215,583,200	100
Wisconsin.....	24,918,700	40.7	9,449,100	15.4	13,910,900	22.7	13,001,700	21.2	61,280,400	100

¹ Includes expenditures on urban extensions of the rural portions of the system (same classification of these extensions as in table 2).

² \$68,587,500 or 31.8 percent of the total was expended on streets in New York City.

TABLE 6.—Amount and percentage of total road and street expenditures in each State, by class of road and street ¹

State	Expenditures made on—								Total	
	Primary rural roads ²		Secondary rural roads ³		Local rural roads ⁴		Urban streets			
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Colorado.....	\$5,211,300	41.1	\$1,975,500	15.6	\$2,977,700	23.5	\$2,511,800	19.8	\$12,676,300	100
Minnesota.....	28,437,800	51.0	12,191,000	21.9	3,894,300	7.0	11,209,500	20.1	55,732,600	100
New York.....	52,489,200	24.3	37,565,600	17.4	22,531,100	10.5	⁵ 102,997,300	47.8	215,583,200	100
Wisconsin.....	⁶ 24,918,700	40.7	⁶ 9,449,100	15.4	13,910,900	22.7	13,001,700	21.2	61,280,400	100

¹ Urban extensions of primary and secondary highways included with urban streets, as in table 3.

² State highways except in Colorado where only Federal-aid roads on the State system are included.

³ County roads except in Colorado where they consist of other State highways not included in the primary system.

⁴ Township roads except in Colorado where they are county roads. There are no township roads in Colorado.

⁵ \$73,229,300, or 34 percent of the total was expended on New York City streets.

⁶ Includes expenditures made on city and village streets forming a part of the primary and secondary systems.

shows the percentage that the primary system is of the entire rural highway system of each State, and also shows the population per mile of primary road.

It will be seen from tables 2, 3, 5, and 6 that considerable disparity existed between the percentage of funds spent on the primary rural roads in the several States and the relative amount of travel on those roads. Only in Colorado was there close agreement between the relative portions of travel and expenditures on the primary roads. In the other three States considerable differences existed: In Minnesota the proportion of expenditures on the primary rural roads was 16.5 percent greater than the proportion of total travel carried on that system; in Wisconsin the percentage of travel exceeded the percentage of expenditures on the primary system by 12 percent. Similarly wide variations existed between travel and expenditures on the other road and street systems of each State.

TABLE 7.—Ratios between mileage of primary highways and mileage of all rural highways, and population per mile of primary highway

State	Percentage that primary highway mileage is of all rural highway mileage in the State	Population per mile of primary highway
Colorado.....	7.2	290
Minnesota.....	6.1	379
New York.....	14.9	1,015
Wisconsin.....	12.3	288

Before the initiation of highway-user taxation, and even until quite recently, streets and roads were very largely financed with general property taxes. Under such a system it was unavoidable that inequities in the

tax burden should exist and that individuals or groups were taxed to support services from which they received little apparent benefit, or of which they made little immediate or direct use. The shift of the source of revenues for highway construction and maintenance from general property taxes to motor-vehicle and motor-fuel taxes has been considerably accelerated in recent years; but while highway-user taxes now finance most of the primary State highway work in these four States, a large part of other road and street expenditures is still financed with general property taxes.

Though it is frequently contended that the primary highways should be supported entirely out of highway-user taxes, in almost one-third of the 48 States, State revenues from motor-vehicle registration fees and gasoline taxes in 1936 were less than the total expenditures for construction and maintenance on the respective State primary systems. A definite change has occurred from the earlier policy of financing streets and highways out of general funds, and the four States included in this study have made considerable progress toward financing primary highways from highway-user revenues.

An early contention was that many nonhighway users were inequitably taxed because property taxes paid by them went to the support of roads they did not use. A more current claim is that large groups of highway users are being assessed for facilities they use only to a small degree. This claim is partly based on urban residents' contentions that a large portion of their annual vehicle travel is performed on the streets of the municipality of residence, and that they make but relatively slight use of the rural roads which are constructed and maintained from gasoline and motor-vehicle taxation.

Road-use surveys have been made to determine accurately the facts needed to answer the question: Who utilizes the existing highway facilities?

DATA GIVEN ON HIGHWAY TRAVEL, REVENUES, AND EXPENDITURES

Tables 8 to 12, inclusive, show comparable figures for the source of travel, the source of revenues, and the expenditures on each of the highway systems of the States. It can be seen in table 8 that revenues from other-than-highway-user taxes played a very important part in highway finance in Minnesota and New York. In the latter State more than 40 percent of the street and highway expenditures was made out of general revenues.

TABLE 8.—Sources of revenues spent for roads and streets

State	Total street and highway expenditures	Specific street and highway imposts	Street and highway expenditures from general revenues	
			Amount	Percent
Colorado.....	\$12,676,300	\$12,004,800	\$671,500	5.3
Minnesota.....	55,732,600	39,682,100	16,050,500	28.8
New York.....	215,583,200	127,485,400	88,097,800	40.9
Wisconsin.....	61,280,400	53,186,000	8,094,400	13.2

¹ \$59,517,300, or 46.7 percent, was specifically levied on New York City residents.

TABLE 9.—Specific street and highway imposts paid by rural and urban residents

State	Paid by residents of—				Total	
	Rural areas		Incorporated places			
	Amount	Percent	Amount	Percent	Amount	Percent
Colorado.....	\$3,556,400	29.6	\$8,448,400	70.4	\$12,004,800	100
Minnesota.....	16,880,000	42.5	22,802,100	57.5	39,682,100	100
New York.....	26,051,200	20.4	101,434,200	79.6	127,485,400	100
Wisconsin.....	23,035,200	43.3	30,150,800	56.7	53,186,000	100

¹ \$59,517,300 or 58.6 percent paid by New York City residents.

TABLE 10.—Percentage of total highway expenditures paid by rural and urban residents

State	Paid by residents of—		Total
	Rural areas	Incorporated places	
	Percent	Percent	Percent
Colorado.....	27.5	72.5	100
Minnesota.....	37.2	62.8	100
New York.....	21.5	78.5	100
Wisconsin.....	46.9	53.1	100

TABLE 11.—Percentage of residents in rural and urban areas in 1930

State	Residents of—		Total
	Rural areas	Incorporated places	
	Percent	Percent	Percent
Colorado.....	38.0	62.0	100
Minnesota.....	37.7	62.3	100
New York.....	13.6	86.4	100
Wisconsin.....	37.1	62.9	100

¹ 55.1 percent of the total population resided in New York City.

In studying these figures, it must be remembered that each of the States included in this study has at least one large city whose finances and physical and economic characteristics are profoundly different from those of the rest of the State. This is most pronounced

in New York. While New York City alone, not including the very populous surrounding metropolitan area, comprised 55.1 percent of the population of that State; Milwaukee had but 19.7 percent of Wisconsin's population; Minneapolis and St. Paul together had but 28.7 percent (18.1 percent and 10.6 percent, respectively) of Minnesota's population; and Denver had but 27.8 percent of Colorado's population.

This accounts for some of the striking differences in New York data. Most of the specific highway imposts paid by New York City residents were in the form of motor-vehicle and motor-fuel taxes. Most of the funds for street construction in the city came out of general funds. Consequently, with necessary street expenditures large by virtue of the very size of the city, the portion of all street and highway expenditures met out of general revenue in the State as a whole was very greatly affected by the New York City expenditures of this type. The effect of New York City on data for the entire State is apparent in all tables of this group.

TABLE 12.—Estimated percentage of motor vehicles owned by residents of rural and urban areas

State	Vehicles owned in—		Total
	Rural areas	Urban areas	
	Percent	Percent	Percent
Colorado.....	29.5	70.5	100
Minnesota.....	39.8	60.2	100
New York.....	19.5	80.5	100
Wisconsin.....	41.8	58.2	100

¹ 34.7 percent of the total number of vehicles were owned by residents of New York City.

The detailed fiscal studies in these States indicated that highway-user revenues are generally sufficient for financing the State highways, and that those street and highway expenditures that had to be met out of other or general revenues (shown in table 8) were generally for local roads and streets.

Several measures of benefit have been suggested for use in determining the proper allocation and assessment of taxes for the construction and maintenance of highway facilities. Different measures have been applied in various States, frequently because of expediency rather than because of any general or specific knowledge of what constitutes an equitable base for levying highway taxes. It is desirable to determine first the existing relationships that would govern the selection of an equitable base.

Table 9, which shows the amounts of revenues ⁵ paid by residents of rural and urban areas in these four States, indicates by comparison with the data of tables 10, 11, and 12 that—

1. No uniform relation exists between the source of specific highway imposts and the source of revenues for all highway expenditures, as distinguished between rural and urban areas. Most of the specific highway revenues came from urban residents. The relatively high percentage shown for rural residents in Minnesota results from the fact that Minnesota townships levy specific property taxes for highway purposes.⁶

⁵ Under the definitions used in these surveys, specific highway taxes are those taxes levied on motor-vehicle users, as motor-vehicle registration fees, motor-fuel taxes, and other taxes that are specifically levied and committed to highway purposes. Thus, when local property taxes, levied and collected on the basis of some budgetary schedule, are used to defray highway expenditures, the portion so used is not considered a specific highway levy unless that portion of the levy scheduled for highway purposes was definitely committed for that use and could not be used interchangeably with other funds for other governmental purposes.

⁶ See PUBLIC ROADS, March 1936, page 11.

2. Only in Colorado is the percentage of rural residents in the State appreciably higher than the percentage of revenues for highway expenditures that came from rural residents. In Minnesota the percentages are approximately the same and in New York and Wisconsin the population percentages are considerably lower. The ratios between the percentage of rural residents in the total population and the percentage of total highway costs paid by rural residents in these four States were as follows:

Colorado.....	1.38
Minnesota.....	1.01
New York.....	.63
Wisconsin.....	.79

In other words, Colorado rural residents paid less for the support of their streets and highways than might have been expected as reasonable on a purely per-capita basis. The variation in the other direction was greatest in New York.

3. In all States the situs of ownership of motor vehicles corresponds somewhat closely to the source of revenues spent for highways. When ratios are set up similar to those above, we find that in each of the four States the ratios between the percentage of total motor vehicles owned in rural areas and the percentage of total highway costs paid by rural residents were as follows:

Colorado.....	1.07
Minnesota.....	1.07
New York.....	.91
Wisconsin.....	.89

These ratios indicate that rural residents in Colorado and Minnesota owned motor vehicles in excess of their contributions to highway costs.

Comparison of the tables also reveals that only in Colorado was the percentage of rural motor-vehicle ownership lower than the percentage of rural population. The ratios between the percentage of rural-owned motor vehicles in the State and the percentage of rural population were as follows:

Colorado.....	0.78
Minnesota.....	1.06
New York.....	1.43
Wisconsin.....	1.13

COMPARISONS MADE OF HIGHWAY USE AND TAXATION

All these suggested criteria of highway taxation bases, i. e., source of specific levies, distribution of population, and distribution of motor-vehicle ownership, fail to indicate what relations should exist between highway-user taxation and highway expenditures; they indicate only what the present relations are. It is therefore desirable to investigate the data available as to street and highway use and to determine (1) if such data provide a basis for establishing an equitable taxation system to furnish revenues for the street and highway system, and (2) if present revenues are derived from various population groups in proportion to their interest in and use of the various highway systems.

Pertinent data on this phase of the subject are presented in tables 13 to 21, inclusive, which show:

1. The sources of funds spent on the primary State highway systems, as derived from rural and urban residents, compared with the use of these highway systems by rural and urban residents.

2. Similar comparisons for expenditures on and the use of—

a. County roads, which frequently comprise the secondary road system of the State.

b. Local rural roads.

c. City and village streets.

d. All roads and streets within the State.

Comparisons of these data are also shown graphically in figures 1 to 5. These tables and figures illustrate the following facts disclosed by the road-use surveys in these four States:

1. Colorado and Minnesota rural residents contributed more to the primary State highway systems of their respective States than their proportionate travel on those systems; New York rural residents paid far less than their proportionate use; and Wisconsin rural residents paid almost in proportion to use. The respective ratios of expenditures to travel are: Colorado—1.33; Minnesota—1.10; New York—0.65; and Wisconsin—1.05.

The proportion of truck and bus travel was found to be approximately the same in all four States. In New York it comprised 16.3 percent of the total travel on the State primary system. Strikingly enough, a larger percentage of the total truck and bus travel on primary roads originated in rural areas than originated from New York City. The highest percentage of the total truck and bus travel in New York originating in one group of places was in the group of cities having populations between 75,000 and 400,000, while the percentage was lowest in Buffalo.

Somewhat similar conditions were noted with respect to the use of secondary roads. More than one-fourth of the secondary highway travel originating in New York City was attributable to trucks and busses.

Travel on Minnesota primary highways was very similar to New York's in that 17.3 percent was truck and bus travel; and, as in New York, of rural motor-vehicle owners' travel on primary highways, more was occasioned by trucks and busses than in the case of any other population group. Of the travel on secondary roads, 16.9 percent was occasioned by trucks and busses.

Truck and bus travel constituted a somewhat larger percentage of motor travel in Colorado than in the other States. On the primary system 24.3 percent of the total travel by Colorado vehicles was truck and bus travel; 18.4 percent of the secondary road travel was attributable to those vehicles; and for all roads and streets such travel accounted for 19 percent of the total.

2. In all four States, rural residents accounted for a greater share of the travel on the secondary roads than their relative contribution to the support of those roads. In Wisconsin the proportions were more nearly equal than in any of the other States. The condition revealed in New York was somewhat unexpected, since the secondary system consists generally of good to excellent roads. It had been thought that the system was well used and served as an important adjunct to the primary system. As a result of the disclosures of the New York survey immediate steps were taken to divert some of the primary system travel to the secondary system by marking such roads and their termini more adequately. The close relation between use and payment in Wisconsin is possibly due in part to a well-maintained and carefully planned county system, adequately marked and signed.

The respective ratios between expenditures and travel by rural residents on the secondary systems were as follows: Colorado—0.68; Minnesota—0.74; New York—0.64; Wisconsin—0.92.

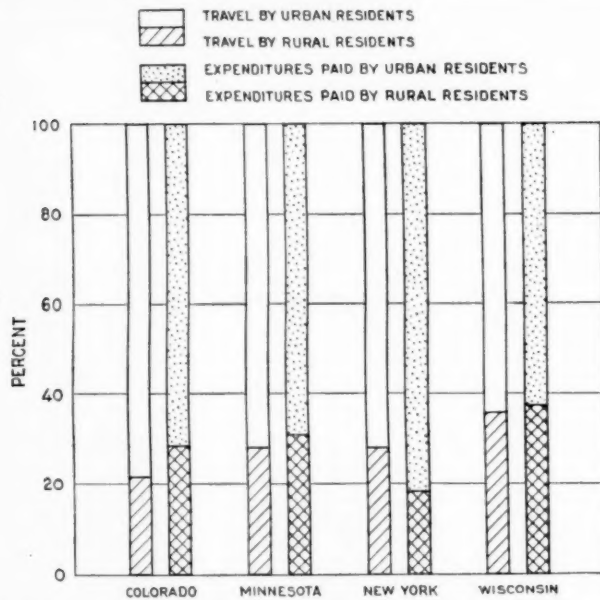


FIGURE 1.—PERCENTAGES OF TRAVEL PERFORMED AND EXPENDITURES PAID BY RESIDENTS OF URBAN AND RURAL AREAS, ON PRIMARY STATE HIGHWAYS.

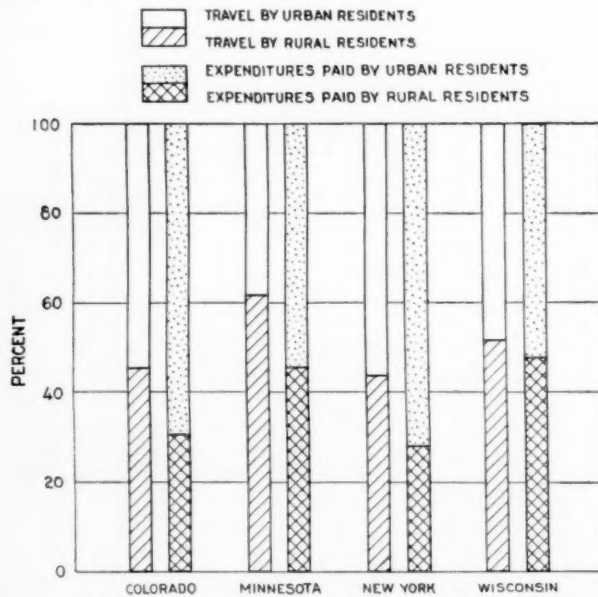


FIGURE 2.—PERCENTAGES OF TRAVEL PERFORMED AND EXPENDITURES PAID BY RESIDENTS OF URBAN AND RURAL AREAS, ON SECONDARY ROADS.

3. Only in Colorado did rural residents' contributions to local roads fail to outweigh their use of those roads. These local roads in Colorado are county roads, and receive the larger portion of their support from urban residents because necessary road funds are largely derived from the State motor-vehicle fees and motor-fuel taxes to which urban residents contribute a large share. In the other States the local roads are under township jurisdiction and receive the larger share of their support from township property taxes. This is notably evident in Minnesota where the township roads are entirely financed by township property taxes.

The respective ratios between expenditures and travel by rural residents on the strictly local rural roads were

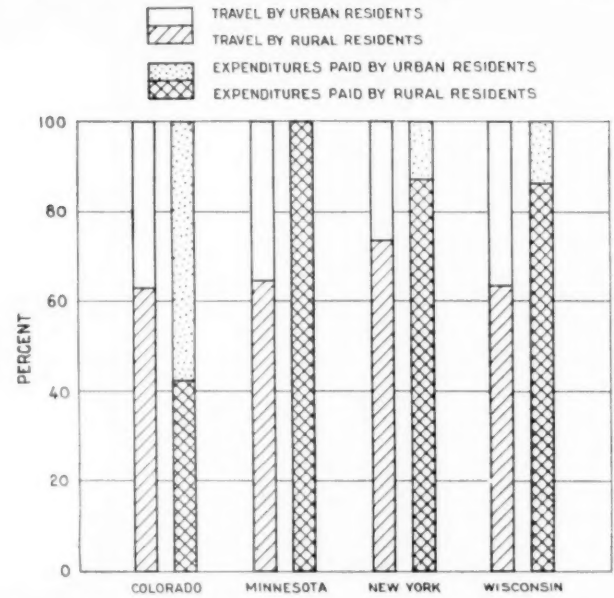


FIGURE 3.—PERCENTAGE OF TRAVEL PERFORMED AND EXPENDITURES PAID BY RESIDENTS OF URBAN AND RURAL AREAS, ON LOCAL RURAL ROADS.

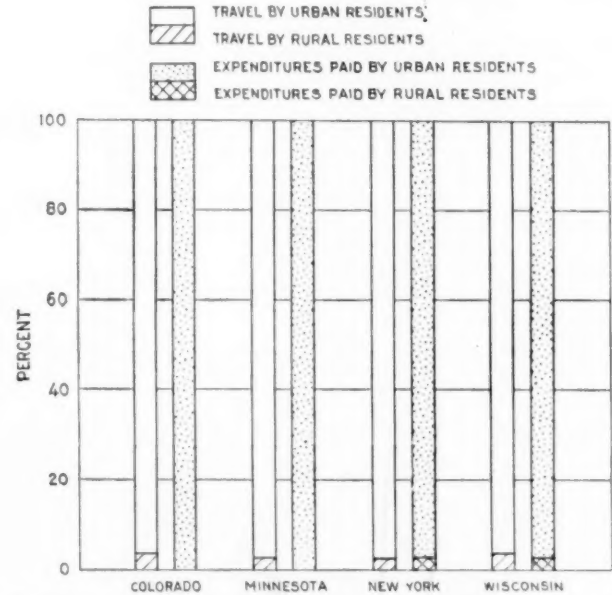


FIGURE 4.—PERCENTAGES OF TRAVEL PERFORMED AND EXPENDITURES PAID BY RESIDENTS OF URBAN AND RURAL AREAS, ON URBAN STREETS.

as follows: Colorado—0.67; Minnesota—1.55; New York—1.18; Wisconsin—1.36.

Surprisingly enough, more than one-fourth of the New York travel on township roads was by trucks and busses—but this was largely composed of light trucks which in many instances served their owners both as trucks and passenger cars. Approximately 20 percent of the travel on Minnesota's township roads was likewise performed by trucks and busses.

4. The financing and use of urban streets may be said to have been done almost entirely by urban residents. The highest percentage of rural use of urban facilities was in Wisconsin, where the survey indicated almost 8 percent of the travel on urban streets was performed by rural residents.

Comparisons of the data given in tables 13 to 19 reveal some interesting relationships. It was noted in the comments on tables 8 to 12 that these figures indicated what relationships existed but did not reveal what they should be under an equitable taxation system. In later tables comparisons between travel by rural residents and their contributions to the highways of the States have been made. It was observed that there were wide variations with respect to contributions to and use of the primary system. Colorado, Minnesota, and Wisconsin rural residents contributed more, proportionately, than they used the primary highways. In all four States rural residents contributed less, proportionately, to the secondary systems than their

TABLE 13.—Percentage of expenditures on the respective State primary highway systems paid by rural and urban residents

State	Paid by residents of—		Total
	Rural areas	Incorporated places	
	Percent	Percent	Percent
Colorado ¹	28.6	71.4	100
Minnesota	30.8	69.2	100
New York	18.2	81.8	100
Wisconsin	37.4	62.6	100

¹ Includes only the Federal-aid portion of the State highways.

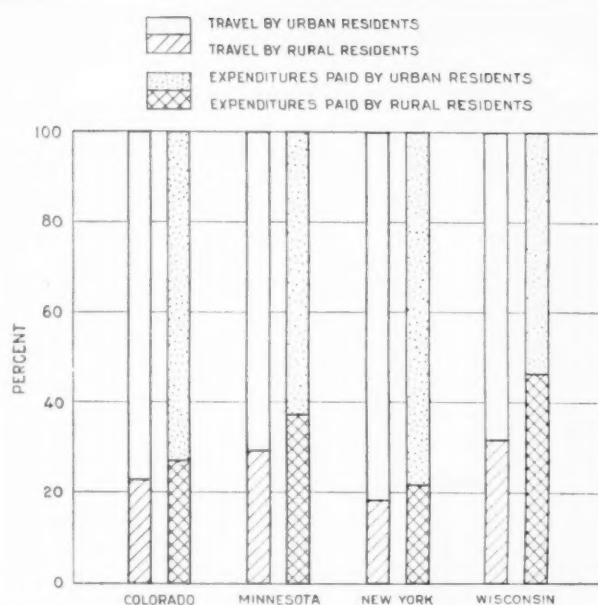


FIGURE 5.—PERCENTAGES OF TRAVEL PERFORMED AND EXPENDITURES PAID BY RESIDENTS OF URBAN AND RURAL AREAS, ON ALL STREETS AND HIGHWAYS.

TABLE 14.—Estimated distribution of travel annually on the respective State primary highway systems

State	Travel performed on—									
	Rural roads				Urban extensions				Entire State primary system	
	By rural residents		By urban residents		By rural residents		By urban residents		By rural residents	By urban residents
	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent
Colorado ¹	178.4	21.7	648.0	78.3	29.9	20.3	106.4	79.7	208.3	21.5
Minnesota	527.2	29.8	1,243.2	70.2	110.1	21.8	395.9	78.2	637.3	28.0
New York	1,823.7	30.6	4,128.1	69.4	623.8	22.5	2,148.8	77.5	2,447.5	28.1
Wisconsin ²									1,131.1	35.7

¹ See note 1, table 13.

² See note 2, table 3. It is impossible to separate all travel on urban streets from rural road travel.

TABLE 15.—Percentage of expenditures on county roads paid by rural and urban residents

State	Paid by residents of—		Total
	Rural areas	Incorporated places	
	Percent	Percent	Percent
Colorado ¹	30.9	69.1	100
Minnesota	45.5	54.5	100
New York	28.1	71.9	100
Wisconsin	47.6	52.4	100

¹ Consists of State highways not included in primary system; see also note 1, table 13.

travel on them warranted; for the purely local rural roads, only in Colorado did rural residents contribute less, relatively, than their travel on the roads warranted.

The relationships between expenditures and travel on the combined highway systems will be discussed next.

When the data of tables 10 and 20 are compared, it is found that the ratios between the percentage of rural residents' travel to total travel and the percentage

that rural residents' contributions to highways bear to the total contributions were as follows:

Colorado	0.86
Minnesota	.79
New York	.85
Wisconsin	.68

Comparing the data for rural residents in tables 12 and 20, the ratios between the percentage of travel and the percentage that rural-owned vehicles were of the total motor vehicles are found to be:

Colorado	0.80
Minnesota	.74
New York	.94
Wisconsin	.77

When each State is considered separately, it can be readily seen that in every case the contributions by rural residents are relatively greater than their use of the available highway facilities; and that relatively, their travel on the highway systems of these four States lags behind their proportionate ownership of motor-vehicles. The causes of these conditions are numerous and differ from State to State depending on the extent and nature of highway development.

TABLE 16.—Estimated distribution of travel annually on the respective county road systems

State	Travel performed on—									
	Rural roads				Urban extensions				Entire county road system	
	By rural residents		By urban residents		By rural residents		By urban residents		By rural residents	By urban residents
	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent
Colorado ¹	111.6	46.4	128.8	53.6	7.8	35.0	14.5	65.0	119.4	45.5
Minnesota.....	590.1	62.1	360.7	37.9	38.2	58.1	27.5	41.9	628.3	61.8
New York.....	426.9	53.2	374.9	46.8	74.6	21.6	270.7	78.4	501.5	43.7
Wisconsin ²									419.8	51.6
									393.7	48.4

¹ See note 1, table 15.² See note 2, table 3. It is impossible to separate all travel on urban streets from rural road travel.

TABLE 17.—Percentage of expenditures on local rural roads paid by rural and urban residents

State	Paid by residents of—		Total
	Rural areas	Incorporated places	
	Percent	Percent	Percent
Colorado ¹	42.5	57.5	100
Minnesota.....	100.0	0	100
New York.....	87.2	12.8	100
Wisconsin.....	86.2	13.8	100

¹ County roads; in all other States these are township roads.² Because of fund relationships involved and the overlapping of the functions of the towns and the incorporated villages, it is impractical to determine the true contributions; but it would appear that at least 13 percent of the cost of town highway construction and maintenance was borne by the residents of New York cities and villages.

TABLE 18.—Percentage of expenditures on urban streets paid by rural and urban residents

State	Paid by residents of—		Total
	Rural areas	Incorporated places	
	Percent	Percent	Percent
Colorado.....	0.0	100.0	100
Minnesota.....	0	100.0	100
New York.....	2.9	97.1	100
Wisconsin.....	2.7	97.3	100

¹ It is impractical to determine the exact rural and urban contributions to urban streets, but on the basis of the payment of or use of State funds for urban streets it would appear that approximately these percentages of the costs of urban streets were contributed by the two classes of residents.**CLOSE CORRELATION FOUND BETWEEN REGISTRATIONS, EXPENDITURES, AND TRAVEL PER MILE OF HIGHWAY**

It is believed that the data shown here illustrate clearly the existing conditions and point the way toward remedies that might be effected. Undoubtedly, thorough

investigation along several lines will be necessary to discover the causal factors behind the ratios appearing above, and to work out the remedial measures that should be taken.

These comparisons are also clearly shown in figures 1 to 5, inclusive. The bar diagrams illustrate the uniformity of relationships in the four States with the following exceptions:

1. The primary system in New York.
2. The local rural roads in Colorado.
3. Urban streets in Wisconsin.

A comparison of the travel on each of the systems and the actual mileage of those roads will also be made. Comparisons of tables 2 and 21 indicate: (1) That the percentage of travel on the primary systems is much higher in all States than the proportionate lengths of those systems; (2) that these percentages are more nearly equal for the secondary roads; and (3) that the widest discrepancy occurs in the case of local rural roads and urban streets. In Colorado the local (county) roads carry 8.9 percent of the travel and comprise 76.7 percent of the street and highway mileage of the State, while the city and town streets carry 28.8 percent of the travel and account for only 6.3 percent of the total road and street mileage.

Certain travel data are available for five other States in which financial surveys were made without the accompanying road-use surveys.⁷ Questionnaires returned by motor-vehicle owners in these States provided data as to the total annual travel by motor-vehicle owners on the streets and roads of the States of which they were resident.

In figure 6 some comparisons of the data obtained in these nine States are presented. The number of vehicles per mile of road, expenditures per mile of road,

⁷ These States and the years for which the surveys were made are: Michigan, 1930; Illinois, 1930; New Hampshire, 1932; Wyoming, 1932; and New Mexico, 1932.

TABLE 19.—Estimated distribution of travel annually on the respective local rural roads and urban streets

State	Travel performed on—									
	Local rural roads				Urban streets				All local roads and streets	
	By rural residents		By urban residents		By rural residents		By urban residents		By rural residents	By urban residents
	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent
Colorado.....	110.2	63.1	64.7	36.9	21.0	3.8	546.5	96.2	131.2	17.7
Minnesota.....	201.3	64.7	109.9	35.3	43.2	2.8	1,484.4	97.2	244.5	13.3
New York.....	372.3	73.8	132.5	26.2	1,232.5	2.6	8,863.9	97.4	604.8	6.3
Wisconsin.....	301.8	63.5	173.3	36.5	58.8	3.8	1,486.3	96.2	360.6	17.8

¹ 2,200,000 vehicle-miles on New York City streets.² 5,402,300,000 vehicle-miles on New York City streets.³ This does not include street travel on the primary and secondary systems where the connecting portions in urban areas were used.

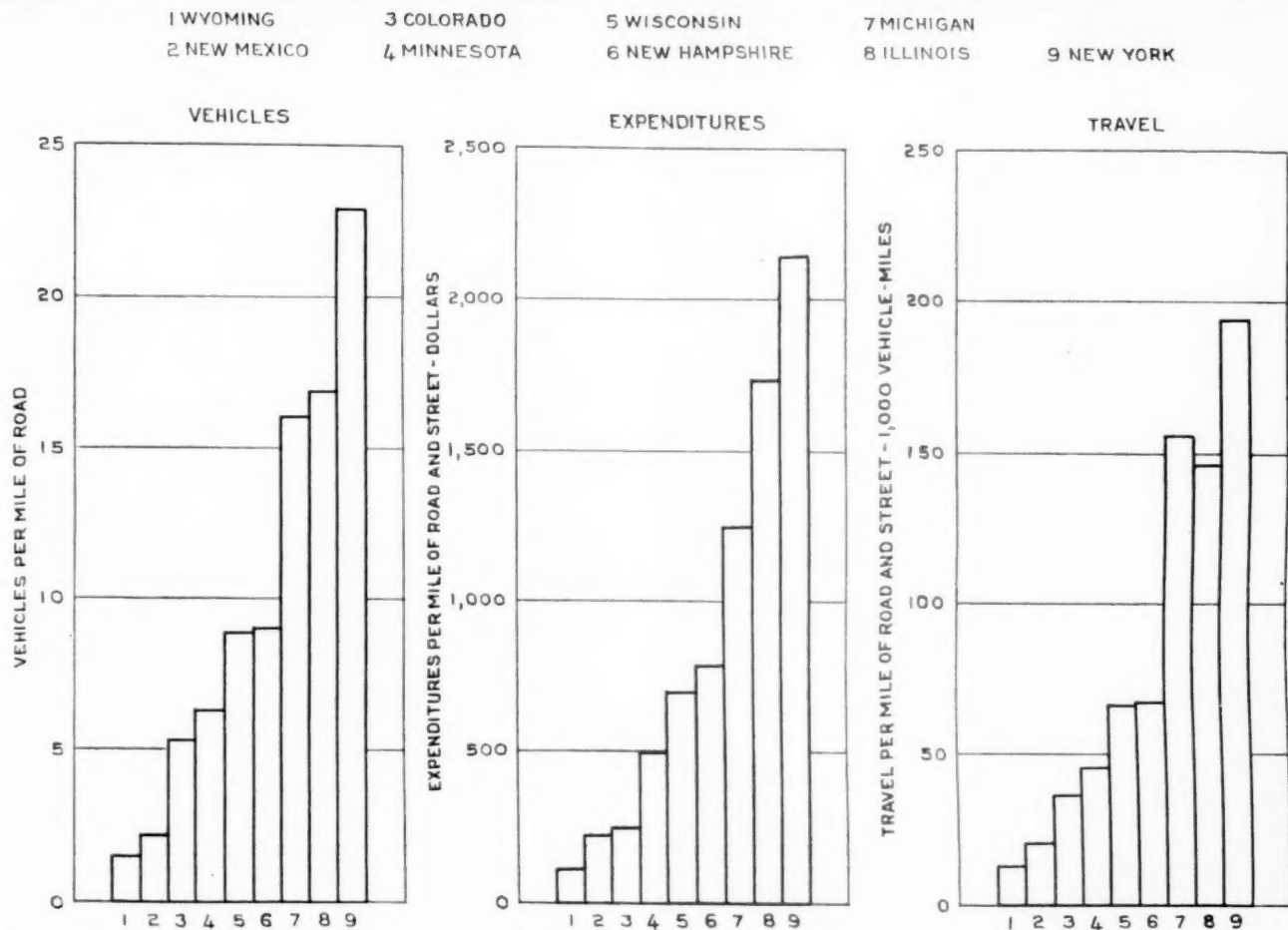


FIGURE 6.—COMPARISON OF VEHICLES PER MILE, EXPENDITURES PER MILE, AND TRAVEL PER MILE, ON ALL ROADS AND STREETS IN NINE STATES.

TABLE 20.—Estimated distribution of travel annually on all streets and highways

State	Travel performed on—									
	Rural roads				Urban streets				All streets and highways	
	By rural residents		By urban residents		By rural residents		By urban residents		By rural residents	By urban residents
	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent	Million vehicle-miles	Percent
Colorado.....	400.2	32.2	841.5	67.8	58.7	8.1	667.4	91.9	458.9	23.3
Minnesota.....	1,318.6	43.5	1,713.8	56.5	191.5	9.1	1,907.8	90.9	1,510.1	29.4
New York.....	2,622.9	36.1	4,635.5	63.9	1,930.9	7.6	11,283.4	92.4	3,553.8	18.3
Wisconsin.....									1,911.5	31.9
									4,085.5	68.1

¹ 16,400,000 vehicle-miles on New York City streets.

² 6,019,200,000 vehicle-miles on New York City streets.

³ See note 2 table 3. It is impossible to segregate all travel on urban streets from rural road travel.

and vehicle-miles of travel per mile of road for each State are shown. In each of these three comparisons, all of the States bear the same general relationship to each other except Illinois, where the total travel per mile of road was lower than that of the preceding State (Michigan).

Measurable increases in the total travel on the various road systems have occurred since these studies were made, as evidenced both by increased annual travel per vehicle (as revealed by gasoline consumption data) and by an increase in the number of registered vehicles. The State-wide highway planning surveys now in prog-

ress in these 9 States and in 34 other States will reveal these changes and will indicate whether or not these increases have altered the relationships shown in figure 6.

Figure 7 shows in a different manner the same relationships as figure 6 for the four States Colorado, Minnesota, New York, and Wisconsin. This figure further illustrates that a State having a high expenditure per mile of road and street also has a large number of vehicles per mile of road, and also has a correspondingly great amount of travel per mile of road.

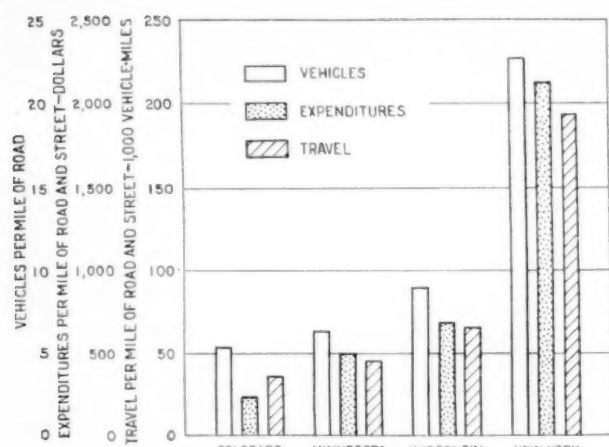


FIGURE 7.—COMPARISON OF VEHICLES PER MILE, EXPENDITURES PER MILE, AND TRAVEL PER MILE ON ALL ROADS AND STREETS IN FOUR STATES.

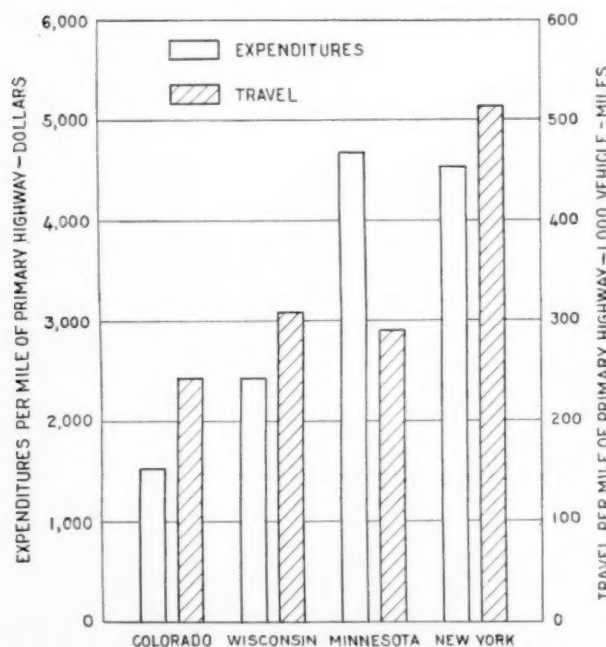


FIGURE 8.—COMPARISON OF EXPENDITURES PER MILE AND TRAVEL PER MILE ON THE PRIMARY RURAL HIGHWAYS IN FOUR STATES. (TRAVEL FIGURES FOR WISCONSIN ARE IN VEHICLE-MILES PER MILE OF ALL PRIMARY HIGHWAYS.)

The number of vehicles per mile of road in Colorado was 5.4 and expenditures per mile were \$241, while in Wisconsin with 8.9 vehicles per mile of road, or 65 percent more than in Colorado, expenditures were \$684 per mile, or 184 percent greater than for Colorado.

Corresponding figures are observed in connection with travel per mile of road. In Colorado, the annual travel of 37,400 vehicle-miles per mile of road was accompanied by an annual expenditure of \$241 per mile; whereas in Minnesota, greater travel, 46,000 vehicle-miles per mile of road, accompanied expenditures of \$500 per mile of road. Thus, travel in Minnesota was but 23 percent greater than in Colorado, yet the former's expenditures were 107 percent greater, when compared on this basis.

Figures 8 to 11, inclusive, illustrate in detail the relations existing between travel per mile of road and

expenditures per mile of road for each of the street and highway systems in these four States.

Although these relationships follow similar trends, figure 8 indicates that for Minnesota, by comparison with the other three States, the travel per mile on the rural portions of the primary State highways did not correspond with the large unit expenditures.

TABLE 21.—Percentage distribution of total road and street mileage in each State

State	Mileage of—				Total
	Primary rural roads ¹	Secondary rural roads ²	Local rural roads ³	Urban streets	
	Percent	Percent	Percent	Percent	Percent
Colorado	6.5	10.5	76.7	6.3	100
Minnesota	5.4	28.2	65.1	1.3	100
New York	11.4	11.6	59.7	17.3	100
Wisconsin	11.4	15.4	65.8	7.4	100

¹ State highways except in Colorado where only Federal-aid roads are included.

² County roads except in Colorado where State roads not included in the primary system are so classed.

³ Township roads except in Colorado where this group consists of county and forest roads.

⁴ Percentages computed without including most street mileage, for which data were not available. The amount shown here represents the streets that formed the urban connections of the State and county highways.

⁵ 5.3 percent of New York mileage was comprised of New York City streets.

The ratios shown for Colorado and New York are surprisingly similar. New York expenditures per mile of primary rural road were 197 percent greater than those for Colorado, whereas New York travel expressed in vehicle-miles per mile of primary rural road was approximately 113 percent greater. Comparisons with Wisconsin data are not entirely satisfactory because travel on urban and rural portions of the system cannot be separated.

A similar condition to that noted for Minnesota in figure 8 is seen to have existed for the rural portions of county roads in New York (fig. 9). Expenditures per mile of these roads were eight times greater than those reported in Colorado, and seven and one-quarter times greater than those in Minnesota, but travel was only about 58 percent greater than travel on Colorado secondary roads and 76 percent greater than that in Minnesota.

EXPENDITURES PER VEHICLE-MILE OF TRAVEL LEAST ON URBAN STREETS

The uniformities noted for the entire road network within these States (fig. 7) and for the primary systems (fig. 8) do not extend so markedly to the secondary roads. The greater variations for secondary roads are undoubtedly caused largely by the fact that the development, function, and use of the secondary roads are more divergent than for the primary roads or even for the local roads and streets.

Primary highways generally serve as trunk-line transportation systems; local rural roads usually receive their greatest utilization from the residents living adjacent to them, just as the principal function served by city and village streets is the handling of local traffic. Secondary roads are generally integral accessories of the primary roads; sometimes they serve more generally as primary local roads; and occasionally, laid out without rational plan or purpose, they merely exist, serving various needs. It is not surprising then that the conditions shown in figure 9 are found; nor is it surprising that these nonuniform conditions affect the relationships for all roads and streets but very little, since the

travel and expenditures on the secondary systems generally constitute but a small percentage of the total highway travel and expenditures in the State. In these four States, the travel on the secondary systems constituted the following percentages of the total travel within the States:

	Percent
Colorado.....	13.4
Minnesota.....	19.8
New York.....	5.9
Wisconsin.....	13.6

Expenditures on the secondary systems constituted the following percentages of the total street and highway expenditures within the respective States:

	Percent
Colorado.....	16.3
Minnesota.....	22.8
New York.....	17.8
Wisconsin.....	15.4

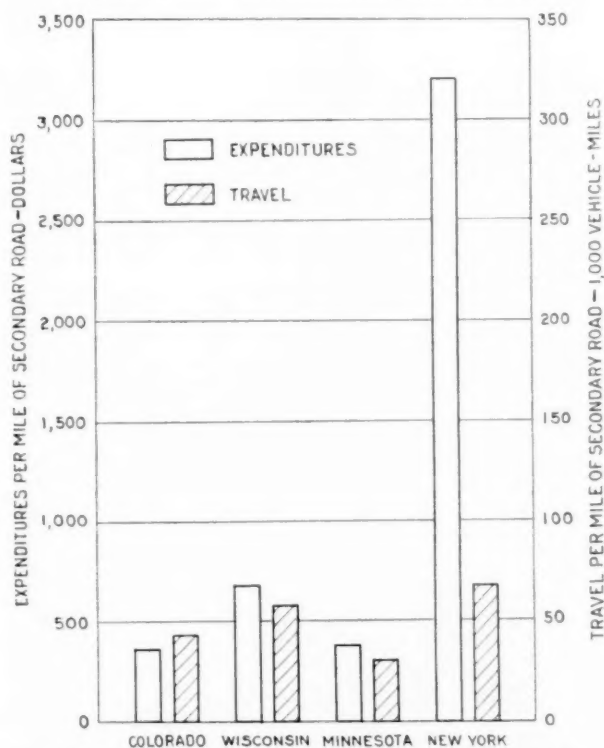


FIGURE 9.—COMPARISON OF EXPENDITURES PER MILE AND TRAVEL PER MILE ON SECONDARY RURAL ROADS IN FOUR STATES. (TRAVEL FIGURES FOR WISCONSIN ARE IN VEHICLE-MILES PER MILE OF ALL SECONDARY ROADS.)

The differences shown in these figures are more strikingly illustrated by figure 9 where travel and expenditures for the rural portions of the systems are shown.

Great variation is also noted in the township road relationships, shown graphically in figure 10. Though there is but comparatively little variation in travel per mile of local road in the four States, expenditures per mile of road vary from \$54 in Minnesota to \$375 in New York.

Street mileages in Minnesota were not available so figure 11 shows data for only three States.

Another comparison for these four States can be made by showing the expenditures per vehicle-mile of travel on each of the systems. These data are given in table 22.

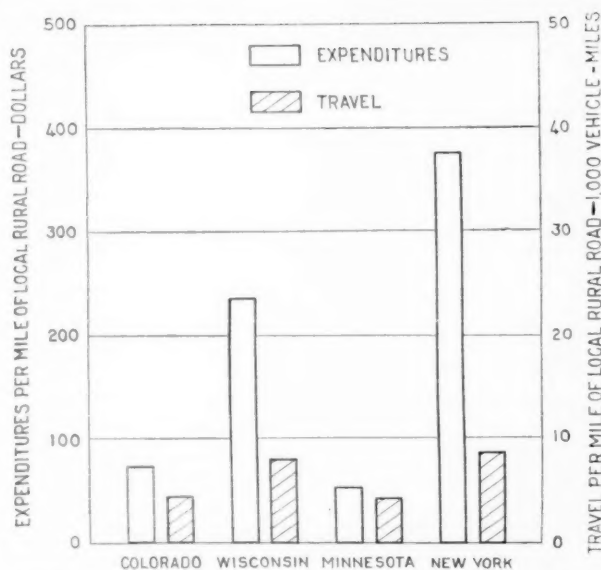


FIGURE 10.—COMPARISON OF EXPENDITURES PER MILE AND TRAVEL PER MILE ON LOCAL RURAL ROADS IN FOUR STATES.

TABLE 22.—Expenditures per vehicle-mile of travel on the various road systems

State	Expenditures per vehicle-mile of travel on—				
	Primary rural roads	Secondary rural roads	Local rural roads	Urban streets	All roads and streets
Colorado.....	\$0.0063	\$0.0082	\$0.0035	\$0.0035	\$0.0064
Minnesota.....	.0161	.0128	.0125	.0053	.0109
New York.....	.0088	.0469	.0446	.0084	.0111
Wisconsin.....	.0220	.0225	.0386	.0032	.0102

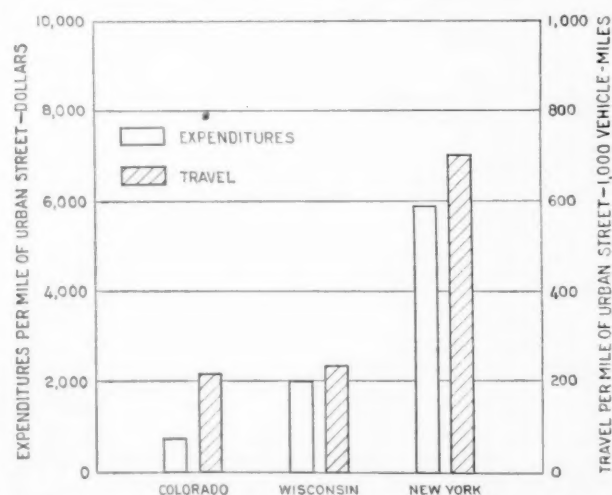


FIGURE 11.—COMPARISON OF EXPENDITURES PER MILE AND TRAVEL PER MILE ON URBAN STREETS IN THREE STATES.

Colorado had the lowest expenditure per vehicle-mile of travel, and the highest costs were for New York secondary and local roads and for Wisconsin township roads. In all States, urban street costs were relatively low, those in New York being the highest. This is not unexpected, as extreme urbanization tends to nullify some of the expected economies by requiring additional expensive facilities.

Before any conclusions are drawn from these data, certain other specific studies that also reveal information of considerable interest should be made.

The four States of this analysis contain three cities having approximately the same population—Buffalo, Milwaukee, and Minneapolis. It is therefore interesting to study the similarity of travel habits of passenger car owners in these cities as revealed by the following data:

The estimated average annual State travel of passenger cars owned in these cities was—

	Miles
Buffalo.....	9, 100
Milwaukee.....	9, 400
Minneapolis.....	9, 800

The approximate percentage of the total travel that was performed on the primary State highways by passenger cars was—

	Percent
Buffalo.....	36. 4
Milwaukee.....	37. 0
Minneapolis.....	37. 1

The number of persons per motor vehicle owned in these three cities also provides an interesting comparison with the first tabulation given above. There appears to be close correlation between these two figures in that the higher average annual travel was reported for the city that had the fewest number of persons per vehicle (Minneapolis). The figures are as follows:

	Persons per vehicle
Buffalo.....	4. 5
Milwaukee.....	4. 2
Minneapolis.....	3. 8

It is also possible to compare percentages of travel performed on rural and urban roads by motor-vehicle owners in various-sized cities of these States. The data are shown in table 23.⁸

It will be observed that the groups of cities have been arranged in ascending order of population and that there is a general tendency for the percentage of total travel on rural roads to decrease as the size of city increases. While the trend is not constant, it is quite evident and discrepancies in most cases can be explained by virtue of the location of the respective cities and the peculiarities of the highway systems serving the cities.

TABLE 23.—Approximate percentage distribution of rural and urban travel by passenger-car owners of selected cities

State	City	Population (1930)	Percentage of travel on—		Total
			Rural roads	Urban streets	
Minnesota.....	Hibbing.....	15, 666	55	45	100
	Rochester.....	20, 621			
	St. Cloud.....	21, 000			
	Winona.....	20, 850			
Colorado.....	Colorado Springs.....	33, 237	45	55	100
	Pueblo.....	50, 096			
New York.....	All places from 15,000 to 75,000.....		43	57	100
	Duluth.....	101, 463			
Minnesota.....	St. Paul.....	271, 606	38	62	100
	All places over 75,000 except Buffalo and New York City.....				
Colorado.....	Denver.....	287, 861	28	72	100
Minnesota.....	Minneapolis.....	464, 356	27	73	100
Wisconsin.....	Milwaukee.....	578, 249	35	65	100
New York.....	Buffalo.....	573, 076	30	70	100
	New York City.....	6, 930, 446	8	92	100

⁸ Data for Wisconsin are not available by individual cities except for Milwaukee.

Similar studies have been made of the distribution of travel performed on the other highway systems of the States by cars owned in these cities. Characteristics similar to those observed in table 23 are plainly discernible.

Study of the travel in various cities indicates that but a small percentage of local travel in large cities comes from outside the city. This is shown in table 24. In each of these large cities well over 80 percent of the total travel on their streets is accounted for by vehicles owned in those cities.

TABLE 24.—Approximate source of travel originating within the respective States and performed on the streets of selected cities

Travel originating in—	Percentage of total State travel performed on the streets of—				
	Denver	Minneapolis	St. Paul and Duluth	Buffalo	New York City
	Percent	Percent	Percent	Percent	Percent
Rural areas.....	5	1	4	5	2
Places under 2,500.....	3	2	1	1	(1)
Places 2,500-15,000.....	4	2	3	3	3
Places 15,000-75,000.....	1	(1)	(1)	6	1
Places 75,000-400,000.....	87	2	83	2	1
Places 400,000-1,000,000.....		92	9	82	(1)
New York City.....				1	93
Total.....	100	100	100	100	100

(1) Less than 0.5 percent.

BASIS FOR EQUITABLE HIGHWAY TAXATION NEEDED

It appears logical to assume that when data from other States become available it will confirm the indications of the present studies. In any event the data will make it possible to establish more definitely the factors controlling the source and distribution of travel within a State by its resident motor-vehicle owners.

Equally interesting is the summary, shown in table 25, of data for several cities arranged in descending order of percentage of population of the State. The relative contributions to travel and highway revenues are indicated for each city or group of cities. The column showing the percentage of total State population represented by each city or group has been included to emphasize the remarkably close correlation with columns 4 and 5.

It will be seen that with the exception of a few cities, the trend of relative contribution to travel on the State highway system follows the population trend of the cities quite closely. The most pronounced difference is in the case of New York City where the picture is distorted because of the fact that so much of New Yorker's travel outside New York City is on the highways of other States. Unless the New Yorker goes north along the Hudson River, he soon crosses the line into adjacent States.

Correlation between population and fiscal contribution by the residents of these cities to the State highway system is extremely close. This type of tabulation seems particularly valuable in setting forth the relationships between particular cities of population groups. Other bases than that of population might well have been selected, preferably motor-vehicle ownership distribution, but the population base appears adequate for showing the existing relationships.

These observations indicate that it may be possible to develop factors with respect to the influences of population, vehicle concentration, geographical loca-

tion, economic conditions, and extent of the highway system, on the basis of which reliable estimates may be made regularly as to the use to which the highway systems are being put. It is essential that such factors be developed if an equitable taxation system is not only to be established but also maintained. The data shown herewith indicate the relationships that appear to exist, the existing sources of data for establishing equitable tax systems, and the necessary factors that need to be developed.

TABLE 25.—Comparison of approximate contributions of residents of selected cities to the financial support of their State highway systems and the percentage of their travel occurring on those systems

State	City	Percentage of total population in State in 1930	Percentage of total annual travel on State highways performed by residents of these cities	Percentage of total annual contributions to State highways paid by residents of these cities	Percentage of total annual State travel by residents of these cities that was on State highways	Percentage of total annual highway contributions by residents of these cities that was expended on State highways
New York..	New York.....	55.1	12	35	16	20
Colorado...	Denver.....	27.8	24	31	36	32
Wisconsin...	Milwaukee.....	19.7	14	19	35	46
	Minneapolis.....	18.1	19	22	36	44
Minnesota...	St. Paul.....	14.6	10	15	32	40
	Duluth.....	9.1	13	12	48	22
	Cities 75,000-400,000.....	9.1	13	12	48	22
New York...	Cities 15,000-75,000.....	8.0	14	11	54	24
Colorado...	Pueblo.....	8.0	11	8	52	33
	Colorado Springs.....	4.5	5	6	34	24
New York...	Buffalo.....	3.1	4	3	47	27
Minnesota...	Cities 15,000-75,000.....	3.1	4	3	47	27

It is probable that the relationships developed in the surveys in these four States have changed somewhat since the studies were made. It is believed, however, that these relationships have remained fairly constant, though total travel may vary considerably. Further research into the validity of the relationships discussed in this article may be an important step in the establishment of an equitable highway taxation program within any given State.

Bearing in mind the various factors and data described above, and realizing that it might be possible to establish a highway development and finance program on the basis of adequate traffic, inventory, and financial-road-use surveys, it should be remembered that no equitable taxation system can be set up with only the factors discussed above as controls. The determination of an equitable basis of taxation for any purpose or for any group of the State involves a thorough study of many factors.

It might be contended that, because the residents of a given city may account for 30 percent of the total travel on a given highway system, they should not contribute more than 30 percent of the funds necessary for the upkeep of that system. While this analysis points out the relationships that exist, it should not be inferred that these considerations alone are adequate for the establishment of a sound highway fiscal policy.

Every unit of society within the State is benefited by the highway system in ways not satisfactorily measurable by present methods. For example, the maintenance of good roads within a fertile agricultural area may make possible the marketing of crops and produce in urban centers that would not otherwise be readily

accessible. Thus, land that might be utilized only as a subsistence producer because of inaccessibility of markets becomes a considerable wealth producer when those markets are made available.

In a similar manner it is impossible to measure the value of the services that urban communities receive from roads serving them. While a city may, on the basis of road use alone, account for only 25 percent of the travel on the highway system, and may contribute 35 percent of the funds used on that system, as yet no method has been devised to measure the benefits derived because the highway has made the city accessible.

Several cities might be selected in the States studied where a good highway system has greatly facilitated the development of the city as a distributing or marketing center. Highway systems have led to the development of new trading areas and have immeasurably benefited the cities or centers so affected.

The value of streets within cities cannot be measured solely by the traffic using them. Even more than in the case of rural roads, they serve as a means of access to property, as essentials to adequate fire protection, as aids to health and sanitation, as thoroughfares for utility services, and in very crowded areas as sources of light and air to the adjacent property. Consequently, it appears justifiable that a substantial percentage of urban street expenditures should be met out of property taxation.

Road-use surveys provide a means of evaluating one of the most important factors in establishing the proper bases of rural and urban taxation for highway purposes. It would be highly desirable to establish additional means of evaluating other benefits received by virtue of the construction and maintenance of our present highway systems. Until satisfactory means can be developed, the most nearly equitable approach appears to be that which evaluates one of the most important single factors in determining the basis of highway finance—the actual use of the existing highway systems.

CONCLUSIONS

The data presented in this analysis summarize the available information on sources of vehicular travel in four States, make possible a few more or less general conclusions, and suggest the direction of further study necessary for the correct determination of a satisfactory highway financing program.

1. Road-use surveys provide suitable and necessary information as to the source and distribution of travel on the highway systems of a State.

2. The proportion of funds for highway purposes paid by rural and urban residents is not closely correlated with the distribution of population in such areas; the proportion of funds paid, however, is somewhat closely allied to vehicle ownership.

3. In a comparison of the four States studied, there is a direct relationship between the density of registration of motor vehicles, the volume of annual travel, and the average annual expenditures per mile of road.

4. Little relation exists between the relative use of the respective highway systems by rural and urban residents and the contributions of those residents for the support of the highways. The closest relationships appear to exist between the use and financing of State primary highways.

5. Use of the various road systems by urban residents appears to vary directly with the location and size of the incorporated place in which the travel originates.

a. Urban residents' travel outside their cities of domicile is almost entirely on the State primary systems.

b. The secondary and local rural road systems are largely used by those vehicle-owners resident on such routes.

c. A very small percentage of the total traffic on city streets originates outside the city, though this percentage appears to increase as the size of the city decreases.

d. The proportion of urban residents' travel on the primary system decreases as the size of the place increases.

6. The relation of travel distribution to the situs of motor-vehicle ownership and size of the places or residence of motor-vehicle owners is partially affected by factors of geographical location, condition of the highway system, economic conditions of the community, etc., whose effects are as yet unmeasured.

7. Until other factors can be ascertained the results of the road-use surveys provide the sole criterion upon which equitable and adequate highway finance programs can be established.

The questions propounded in the first part of this analysis cannot be entirely answered by road-use

surveys, but much factual data can be obtained to provide a working basis for highway tax legislation until complete data are made available.

BIBLIOGRAPHY ON HIGHWAY SAFETY NOW AVAILABLE

A selective bibliography on highway safety has recently been published by the Bureau of Public Roads of the United States Department of Agriculture as Miscellaneous Publication No. 296.

The bibliography includes references to books, articles printed in technical and other periodicals, and publications of societies. It covers the period from 1928 through May 1937. Since 1928 traffic conditions have changed so rapidly that prior publications are chiefly of historical value.

Librarians, students, and research workers will find this publication an important aid in locating published material on highway safety.

Single copies of Miscellaneous Publication No. 296 can be obtained, without charge, from the Division of Publications, United States Department of Agriculture, Washington, D. C.

STATUS OF FEDERAL-AID HIGHWAY PROJECTS

AS OF MARCH 31, 1938

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FISCAL YEAR AVAILABLE FOR FUNDING GRANTED PROJ. 1937
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	\$ 1,122,820	\$ 551,410	64.3	\$ 5,550,020	\$ 2,774,155	260.4	\$ 736,910	\$ 368,450	18.1	\$ 6,753,330
Arizona	1,817,080	1,305,224	91.2	1,644,059	1,159,568	79.4	564,311	333,044	35.4	2,107,972
Arkansas	2,854,540	2,835,323	176.0	1,281,994	1,274,137	85.9	102,035	101,707	4.6	4,320,542
California	6,800,621	3,745,997	150.1	7,589,123	3,990,175	136.7	2,614,321	1,396,135	64.3	4,520,149
Colorado	3,176,286	1,767,051	119.8	1,687,061	926,222	56.4	609,769	328,878	16.9	3,638,845
Connecticut	753,198	359,196	9.3	231,220	108,123	8.8	314,610	157,095	3.0	2,142,456
Delaware	467,663	229,797	18.2	70,588	34,105	2.8	645,849	295,161	14.3	1,543,324
Florida	614,637	305,369	21.2	2,822,342	1,411,171	58.3	437,000	218,500	7.7	4,151,640
Georgia	2,110,923	1,020,343	122.5	6,507,517	3,253,350	298.9	952,400	477,700	46.4	7,036,783
Illinois	2,606,681	1,530,005	198.9	1,068,560	636,804	85.3	607,199	360,814	21.5	1,983,721
Indiana	10,478,221	5,126,123	307.4	8,153,961	4,008,249	167.8	3,992,650	1,996,250	72.9	4,921,201
Iowa	5,688,737	2,813,518	132.2	3,469,691	1,734,645	105.9	1,475,460	737,730	31.9	4,427,779
Kansas	6,688,709	3,058,796	219.3	4,961,046	2,241,356	143.6	1,477,728	689,150	44.1	3,305,141
Kentucky	4,657,558	2,305,827	262.3	2,758,336	1,379,069	47.2	2,419,907	1,209,548	104.3	5,720,622
Louisiana	2,386,708	1,189,257	64.8	3,521,394	1,760,697	107.6	3,233,396	1,915,699	147.4	3,118,418
Maine	582,530	286,501	15.0	6,352,674	1,359,105	39.5	6,869,666	1,400,545	50.1	2,982,278
Maryland	1,869,331	934,342	50.7	2,018,226	1,009,113	44.4	445,660	222,825	11.4	1,204,598
Massachusetts	930,330	465,145	13.4	1,814,594	905,534	28.9	460,360	230,180	5.2	2,512,396
Michigan	4,419,633	2,209,815	20.3	1,911,053	955,566	3.5	670,950	335,330	5.2	3,313,685
Minnesota	6,485,843	3,181,092	166.9	5,862,868	2,931,434	135.7	1,304,020	607,710	14.8	3,785,815
Mississippi	6,428,562	3,191,813	312.4	3,517,563	1,747,537	152.4	1,625,106	802,448	79.9	4,245,715
Missouri	2,789,501	1,394,651	138.4	4,023,190	2,010,890	181.2	1,704,720	852,310	68.2	4,572,251
Montana	8,217,741	4,023,184	443.6	5,063,704	2,451,624	140.6	3,257,601	1,379,292	86.7	4,770,139
Nebraska	3,824,816	2,144,049	277.7	1,996,529	1,122,671	83.9	419,566	236,000	33.0	4,547,601
Nevada	2,457,556	1,208,532	255.9	5,115,485	2,544,966	495.0	3,743,014	296,400	216.3	3,728,120
New Hampshire	2,515,471	2,159,343	132.5	708,345	614,170	62.5	341,799	264,400	13.6	2,053,915
New Jersey	360,696	177,963	6.5	2,487,960	1,283,870	11.6	843,973	365,921	11.4	1,234,845
New Mexico	2,055,958	950,684	20.3	541,078	267,567	11.6	274,716	136,523	2.8	2,817,790
New York	3,729,069	2,286,937	260.9	1,993,134	1,315,634	97.0	464,692	283,294	73.0	1,975,873
North Carolina	14,122,720	6,625,591	245.5	12,049,354	5,978,160	210.3	2,163,690	1,080,345	32.1	6,467,239
North Dakota	4,930,582	2,458,637	374.2	6,185,050	2,921,225	252.0	879,660	422,960	49.5	4,255,487
Ohio	971,668	963,709	186.4	1,270,301	1,249,791	77.4	1,607,560	1,470,870	102.4	3,977,710
Oklahoma	4,388,541	2,115,212	56.7	8,839,122	4,389,115	98.5	1,644,123	822,960	16.3	9,290,468
Oregon	3,455,089	1,600,628	170.4	2,523,214	1,463,197	104.4	2,212,415	1,174,092	109.6	5,127,170
Pennsylvania	3,979,127	2,342,471	130.9	1,478,085	901,439	81.1	514,274	313,876	14.9	2,779,439
Rhode Island	12,898,222	6,407,944	176.3	6,818,788	3,332,103	102.2	2,729,711	1,363,818	55.6	7,009,328
South Carolina	912,883	447,633	8.1	796,330	398,165	10.8	454,760	227,380	3.0	1,241,096
South Dakota	3,766,566	1,590,753	260.9	5,149,594	2,184,743	239.7	1,039,331	469,490	43.9	2,282,927
Tennessee	2,391,402	1,352,149	246.1	1,925,003	1,081,040	186.4	1,490,310	837,010	93.4	4,306,391
Texas	1,827,160	910,804	69.5	2,281,404	1,140,702	79.8	2,512,840	1,256,340	78.3	5,852,952
Utah	12,811,762	6,386,604	243.6	11,948,364	5,912,772	660.3	2,899,851	1,376,195	159.8	10,544,912
Vermont	1,349,100	554,211	134.1	751,500	337,038	57.4	369,770	265,024	8.7	2,258,882
Virginia	1,052,720	505,107	29.6	1,679,730	739,095	43.1	6,730	3,169	3.0	670,927
Washington	2,894,694	1,436,704	137.7	5,153,613	2,536,130	139.2	1,243,190	597,619	37.2	2,699,279
West Virginia	2,005,875	1,036,705	74.2	3,649,983	1,915,812	46.1	312,326	163,400	5.4	2,334,617
Wisconsin	1,476,181	741,784	42.1	1,342,447	819,193	39.5	608,427	459,750	9.5	3,030,354
Wyoming	8,232,929	3,976,402	273.6	4,701,047	2,159,177	107.5	894,392	400,300	13.2	3,831,289
District of Columbia	2,502,655	1,485,043	263.2	1,586,299	964,116	160.5	151,720	93,650	7.9	1,689,495
Puerto Rico	678,411	328,796	12.5	627,330	310,380	10.1	691,600	345,340	12.7	1,453,067
TOTALS	185,569,670	96,658,854	7,813.6	176,986,302	86,710,350	5,807.2	67,595,074	32,119,811	2,147.1	185,178,734

*INCLUDES FUNDS APPORTIONED FOR THE FISCAL YEAR 1939

STATUS OF FEDERAL-AID SECONDARY OR FEEDER ROAD PROJECTS

AS OF MARCH 31, 1938

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR UNCOMPLETED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	\$ 36,892	\$ 25,200	2.4	\$ 209,700	\$ 104,850	11.9	\$ 261,190	\$ 137,267	18.2	\$ 948,122
Arizona				7,624	5,489		13,126	6,561		555,231
Arkansas										857,545
California	4,899	2,843	3.2	466,208	266,102	19.0	261,130	151,568	50.8	1,496,185
Colorado				234,586	129,548	11.7	180,550	100,390	7.4	691,650
Connecticut										318,278
Delaware				10,106	5,053					246,875
Florida				117,178	66,377	13.2	258,160	126,960	32.7	669,799
Georgia				247,245	111,953	10.5	119,723	59,841	14.5	1,084,289
Idaho				382,532	191,266	16.1	1,178,400	589,200	101.4	368,596
Illinois							263,288	136,800	23.3	1,286,349
Indiana										1,173,638
Iowa										1,298,449
Kansas	15,224	7,612	17.9	9,850	4,925	6.4	82,500	41,250	1.0	1,277,674
Kentucky	184,353	92,077	72.2	594,800	186,854	89.4	197,605	58,828	22.5	591,918
Louisiana										724,136
Maine				330,916	165,468	21.0	46,400	23,200	2.5	233,463
Maryland	40,550	20,275	2.9	6,264	3,132					409,344
Massachusetts				5,300	2,650					696,530
Michigan				163,702	81,851	3.2	222,760	81,868	42.3	1,532,539
Minnesota										1,215,861
Mississippi				310,340	152,155	52.0	266,880	84,845	22.8	886,927
Missouri	849,923	412,284	223.3	13,983	7,865					881,280
Montana										1,027,170
Nebraska	40,394	20,197	1.1	138,306	69,153	20.9	358,394	179,197	56.5	775,561
Nevada	60,933	52,493	9.1	294,144	294,800	32.9	13,015	11,266		325,932
New Hampshire				101,176	50,152	1.7				196,723
New Jersey							42,310	17,500	1	655,273
New Mexico				312,853	190,813	16.7	222,461	135,695	14.0	440,964
New York	119,880	59,742	12.8	1,906,460	953,230	126.2	318,900	159,450	19.6	1,300,351
North Carolina	140,740	70,370	33.1	439,400	219,700	46.6	284,160	136,990	36.7	756,497
North Dakota										787,252
Ohio				184,400	92,200	3.8				1,739,441
Oklahoma	114,890	62,115	33.8				16,888	8,986		1,175,929
Oregon				24,833	15,177	1.5	92,641	55,525	13.7	695,340
Pennsylvania				91,266	45,633	5.9	936,177	456,869	65.4	1,642,716
Rhode Island				118,988	59,494	3.6	89,590	44,795	2.6	132,231
South Carolina	20,710	10,355	3	52,688	24,000	8.2	454,850	191,200	39.0	463,480
South Dakota				6,250						816,436
Tennessee				152,246	76,123	7.2	42,680	21,340	7	962,027
Texas				91,370	45,985	21.2	1,196,411	576,888	190.0	2,526,198
Utah	16,500	11,750	2.1	150,060	103,180	17.3	247,050	129,575	14.5	327,211
Vermont	77,950	36,975	4.3	192,650	84,190	11.6	3,750	1,875		121,875
Virginia	25,290	12,645	3.2	156,927	76,248	23.6	218,590	109,295	28.3	721,461
Washington	52,357	29,486	14.3	258,810	135,908	16.2	136,212	72,800	12.0	553,648
West Virginia				29,900	14,950	1.7	190,580	95,290	14.8	435,434
Wisconsin	30,710	15,250	6.7	60,026	27,300		230,842	103,700	8.2	1,081,228
Wyoming	75,809	46,849	7.2	255,110	157,630	23.9	123,310	76,190	19.9	351,373
District of Columbia										219,870
Island of Puerto Rico							54,010	27,005	2.4	138,015
TOTALS	2,076,754	1,071,901	476.2	8,371,597	4,298,474	656.9	8,626,533	4,142,031	877.8	39,868,594

* INCLUDES FUNDS APPORTIONED FOR THE FISCAL YEAR 1939

CURRENT STATUS OF UNITED STATES WORKS PROGRAM HIGHWAY PROJECTS

(AS PROVIDED BY THE EMERGENCY RELIEF APPROPRIATION ACT OF 1935)

AS OF MARCH 31, 1938

STATE	APPORTIONMENT	COMPLETED			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROJECTS
		Estimated Total Cost	Work Program Funds	Miles	Estimated Total Cost	Work Program Funds	Miles	Estimated Total Cost	Work Program Funds	Miles	
Alabama	\$ 4,151,115	\$ 3,933,286	\$ 3,884,535	136.9	\$ 260,300	\$ 260,300	7.8				\$ 6,280
Arizona	2,569,841	3,183,466	2,531,233	193.7	38,548	38,548	8.6	\$ 49,746	\$ 49,746	4.0	3,594
Arkansas	3,352,081	3,163,813	3,133,779	351.9	165,042	164,942					33,427
California	7,747,928	7,876,172	7,496,983	263.6	217,622	217,579	.3				997,939
Colorado	3,395,263	2,382,800	2,301,910	99.4	97,797	95,414	6.0				36,067
Connecticut	1,418,709	1,375,662	1,263,206	21.2	55,490	55,000	1.2	124,130	64,435	.2	29,156
Delaware	900,310	871,469	843,920	66.4	10,234	10,234	.2	26,712	17,000	4.4	32,006
Florida	2,597,144	2,601,135	2,526,181	99.1	38,957	38,957					418,655
Georgia	4,985,967	1,948,280	1,894,278	112.3	2,363,094	2,094,714	112.5	581,320	581,320	30.2	22,348
Idaho	2,222,747	2,274,551	2,167,098	185.9	33,341	33,341	23.2				159,008
Illinois	8,694,009	8,124,376	7,849,991	465.2	685,010	685,010					76,175
Indiana	4,941,255	5,211,435	4,816,080	238.0	49,000	49,000					864
Iowa	4,991,664	5,239,568	4,885,935	528.3	105,902	104,865	.3	8,800	8,800	.1	63,303
Kansas	4,994,975	4,728,537	4,674,834	376.2	250,210	248,037	16.5				24,914
Kentucky	3,726,271	3,602,255	3,426,460	355.0	274,897	274,897	3.5				1,803
Louisiana	2,890,429	2,936,860	2,590,622	166.3	239,168	200,933	1.5	97,087	97,070	10.4	5,670
Maine	1,676,799	1,928,430	1,808,980	75.3	62,149	62,149	1.7				293,742
Maryland	3,750,738	773,435	766,648	27.2	467,536	467,536	10.0	233,764	220,812	4.4	60,999
Massachusetts	3,262,885	2,222,067	2,221,883	18.2	896,596	896,596	.6	1,042,586	521,293	.3	23,450
Michigan	6,301,414	6,658,140	5,949,537	288.6	284,921	284,921	3.3	283,938	63,746		35,789
Minnesota	5,277,145	6,417,998	5,174,695	901.8	84,950	79,000					8,462
Mississippi	3,457,552	3,233,596	3,228,502	226.5	158,650	157,610	9.2	10,800	10,800	.6	32,429
Missouri	6,012,652	5,294,408	5,208,447	776.9	790,784	736,082	.7				7,827
Montana	3,676,416	3,597,647	3,566,706	200.7	95,385	95,385	.1				34,391
Nebraska	3,870,739	3,533,482	3,321,687	362.3	446,353	446,353	8.3	70,270	70,270	1.8	60,941
Nevada	2,243,074	2,314,381	2,197,401	110.1	84,570	38,146	1.7				35,789
New Hampshire	945,225	879,925	843,253	37.7	121,092	101,301	5.7				8,462
New Jersey	3,129,805	1,615,032	1,549,984	31.1	1,512,979	1,512,979	4.4	34,468	34,468		7,827
New Mexico	2,871,397	2,811,688	2,805,816	213.7	43,071	43,071		14,681	12,196		32,434
New York	11,046,377	10,709,139	10,243,718	170.0	316,300	276,300	1.9	70,163	70,163	.2	496,196
North Carolina	4,720,173	4,614,368	4,543,988	295.4	120,761	120,761	5.4				49,669
North Dakota	2,857,245	2,488,427	2,440,492	377.9	107,799	107,799	1.2	17,090	9,816	37.5	25,085
Ohio	7,670,815	6,977,466	6,861,887	294.9	703,332	697,332	3.7	293,869	293,869		111,596
Oklahoma	4,580,670	4,563,146	4,318,793	420.8	239,470	239,470	7.6				17,407
Oregon	3,038,682	3,197,374	2,970,434	164.4	45,580	45,580		8,800	5,000	.1	10,783
Pennsylvania	9,347,797	8,022,311	7,438,538	262.7	1,999,561	1,743,728	20.0	10,356	10,356	.2	155,175
Rhode Island	989,208	1,113,140	989,208	18.8							42,811
South Carolina	2,702,012	2,356,294	2,150,784	226.2	551,692	498,752	23.4	9,664	9,664	1.5	29,373
South Dakota	2,976,494	2,681,291	2,676,644	482.9	270,437	270,437					7,133
Tennessee	4,192,460	3,529,833	3,472,059	135.3	713,268	713,268	18.0				44,758
Texas	11,989,350	12,693,455	11,567,575	1,112.8	415,219	377,018	11.9				30,040
Utah	2,067,194	2,161,834	1,925,059	207.7	112,055	112,055	.1				8,000
Vermont	924,306	1,051,289	902,441	23.2	13,865	13,865					82,724
Virginia	3,026,667	3,475,607	3,285,509	939.9	131,731	128,434	13.5	156,000	156,000	1.1	19,916
Washington	3,026,161	3,364,343	2,940,420	164.2	65,884	65,884	.7				55
West Virginia	2,231,412	2,109,240	1,963,718	86.4	275,023	267,639	14.1				7,355
Wisconsin	4,823,884	5,217,220	4,127,229	343.4	91,394	89,300	.3				20,859
Wyoming	2,219,155	2,173,387	2,165,009	152.4	33,287	33,287					
District of Columbia	949,496	950,000	949,496	8.8							
Hawaii	226,033	955,853	871,389	17.4				62,530	54,644	.6	
TOTALS	195,000,000	184,748,511	174,134,854	12,215.0	16,141,000	14,855,863	371.1	3,201,473	2,414,070	99.0	3,595,213

CURRENT STATUS OF UNITED STATES WORKS PROGRAM GRADE CROSSING PROJECTS

(AS PROVIDED BY THE EMERGENCY RELIEF APPROPRIATION ACT OF 1935)

AS OF MARCH 31, 1938

STATE	APPORTIONMENT	COMPLETED			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROJECTS	
		Allocated Total Cost	Works Program Funds	NUMBER Grade Crossing Completed by March 31, 1938	Estimated Total Cost	Works Program Funds	NUMBER Grade Crossing Under Construction by March 31, 1938	Estimated Total Cost	Works Program Funds	NUMBER Grade Crossing Approved for Construction by March 31, 1938		
Alabama	\$ 4,034,617	\$ 3,599,166	\$ 3,583,815	48	1	\$ 503,819	\$ 437,519	5	\$ 41,806	\$ 41,806	1	\$ 13,283
Alaska	1,256,099	1,278,187	1,216,371	15	5	18,841	18,841	5				20,587
Arizona	3,574,060	2,922,486	2,914,937	51	6	611,066	609,574	5				7,633
California	7,486,362	7,359,088	7,189,833	47	8	112,295	112,295	3				174,234
Colorado	2,631,567	2,519,850	2,249,587	27	3	355,944	355,944	3				26,036
Connecticut	1,712,684	479,527	479,527	3	1	1,157,071	1,135,710	7				97,511
Delaware	418,239	130,000	128,144	1	1	279,052	279,052	2				11,043
Florida	2,427,883	2,396,464	2,377,173	30	5	119,018	119,018	1				129,391
Georgia	4,895,949	799,536	790,230	17	7	1,505,839	1,505,839	24				1,689,630
Idaho	1,574,479	1,393,559	1,365,205	20	3	252,696	252,696	2				52,317
Illinois	10,307,184	8,786,476	8,659,771	65	8	1,601,134	1,594,730	11				34,683
Indiana	5,111,096	4,774,115	4,632,081	92	15	450,720	450,720	162				28,233
Iowa	5,600,579	4,568,180	4,465,881	98	9	1,092,875	1,089,000	8				41,738
Kansas	5,246,258	4,410,068	4,384,232	55	5	1,197,512	1,178,217	3				64,661
Kentucky	3,672,357	1,358,467	1,339,404	19	5	1,984,219	1,694,487	5				25,827
Louisiana	3,213,467	1,767,076	1,758,112	18	2	782,183	782,153	2				77,763
Maine	1,426,861	1,267,924	1,263,008	19	1	160,788	142,540	1				21,313
Maryland	2,061,751	701,589	696,981	5	4	844,674	794,674	5				287,819
Massachusetts	4,210,833	2,993,173	2,990,739	22	4	865,680	865,680	4				104,423
Michigan	6,765,197	6,864,894	6,560,766	44	8	101,477	101,477	1				27,225
Minnesota	5,395,441	4,824,289	4,787,124	83	13	590,070	584,020	3				24,237
Mississippi	3,241,475	2,572,055	2,568,447	53	6	1,566,960	1,566,960	7				163,028
Missouri	6,142,153	4,717,600	4,582,409	42	1	245,576	185,931	1				21,134
Montana	2,722,327	2,551,613	2,507,468	37	7	472,542	472,542	5				48,685
Nebraska	3,556,441	2,889,896	2,840,725	76	3	13,308	13,308	1				6,297
Nevada	887,260	877,374	864,025	8	3	53,237	29,170	1				32,487
New Hampshire	822,464	791,275	731,208	9	4	772,334	772,334	4				6,174
New Jersey	3,983,826	3,107,456	3,034,275	20	6	25,879	25,879	10				196,092
New Mexico	1,725,286	1,700,885	1,693,233	19	1	1,877,450	1,877,450	2				28,429
New York	13,577,189	11,691,115	11,348,097	35	47	1,081,059	1,081,059	12				22,726
North Carolina	4,423,958	3,615,380	3,595,570	50	18	389,012	389,012	30				244,357
North Dakota	3,207,473	2,803,739	2,795,735	55	4	5,653,337	5,185,391	5				72,833
Ohio	8,439,957	2,476,397	2,325,149	19	6	1,141,944	1,008,844	5				10,336
Oklahoma	5,004,711	3,938,622	3,921,634	60	9	74,215	74,215	1				287,202
Oregon	2,334,204	2,294,033	2,249,553	16	6	2,850,615	2,850,615	15				6,781
Pennsylvania	11,483,513	9,075,239	8,362,371	71	18	515,927	515,927	5				316,136
Rhode Island	699,691	701,817	692,910	4	3	175,186	175,186	6				32,572
South Carolina	3,059,956	2,118,895	2,093,187	40	12	1,037,450	1,037,450	6				247,169
South Dakota	3,249,086	2,832,595	2,830,936	60	5	476,050	476,050	1				87,696
Tennessee	3,903,979	2,638,938	2,619,360	40	3	18,461	18,461	7				12,554
Texas	10,895,882	9,968,860	9,955,957	127	11	10,300	10,300	2				57,607
Utah	1,230,763	1,253,470	1,152,602	17	1	844,543	844,543	1				41,210
Vermont	729,857	792,414	706,303	10	7	91,167	91,167	1				3,548
Virginia	3,774,287	3,008,095	2,870,531	45	19	1,037,711	1,037,711	12				134,756
Washington	3,092,041	2,987,234	2,964,050	22	12	111,212	111,212	1				45,890
West Virginia	2,677,937	1,599,891	1,557,923	14	3	399,472	399,472	1				
Wisconsin	5,022,683	4,481,639	4,437,446	37	6							
Wyoming	1,360,641	1,213,957	1,203,739	13	10							
District of Columbia	410,804	417,779	410,804	3								
Hawaii	453,703	284,891	284,891	3								
TOTALS	196,000,000	154,267,698	150,797,700	1734	327	610	35,899,475	34,545,537	233	43	336	5,134,114
							6,231,326	5,522,649	77	9	172	